

## CLAIMS:

1. A lubricious composition suitable for use on medical device comprising at least one polymerizable alkoxyated (meth)acrylate compound having at least two acrylate groups per molecule of the compound and a water solubility of about 15% or greater, and at least one second component which provides lubricity.
2. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound has a water solubility of about 50% or greater.
3. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound is a monomer.
4. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound has a molecular weight of about 1000 g/mole or less.
5. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound has at least three (meth)acrylate groups per molecule.
6. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound has about 1 to about 20 moles alkoxyate.
7. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound has about 2 to about 18 moles alkoxyate.
8. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound has 3 to about 15 moles alkoxyate.
9. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound is a non-aromatic alkoxyated (meth)acrylate compound.
10. The lubricious composition of claim 1 wherein said at least one polymerizable alkoxyated (meth)acrylate compound is an alkoxyated trimethylol propane triacrylate.
11. The lubricious composition of claim 1 wherein said alkoxyated trimethylol propane triacrylate is an ethoxyated trimethylol propane triacrylate.
12. The lubricious composition of claim 1 further comprising at least one photoinitiator.
13. The lubricious composition of claim 12 wherein said at least one photoinitiator is a member selected from the group consisting of benzophenones, aromatic-aliphatic

- ketones, acrylated amine synergists,  $\alpha$ -amino ketones, benzil ketals, derivatives thereof, and mixtures thereof.
14. The lubricious composition of claim 13 wherein said at least one photoinitiator is 2,2-dimethoxy-2-phenyl acetophenone.
- 5 15. The lubricious composition of claim 13 wherein said at least one photoinitiator is 2-methyl 1-[4-methylthio] phenyl] 2-morpholinopropan-1-one, 2-benzyl-2-(dimethylamine)-1-[4-morpholinyl]phenyl]-1-butanone or mixture thereof.
16. The lubricious composition of claim 1 wherein said at least one second component is hydrophilic.
- 10 17. The lubricious composition of claim 1 wherein said at least one second component is selected from the group consisting of polyalkylene glycols, alkoxy polyalkylene glycols, polyalkylene oxides, poly((meth)acrylic acids), polyvinylalcohols, poly(meth)acrylamides, polyurethanes, polyvinylsulfonic acids, poly(sodium styrenesulfonates), poly (sodium vinylsulfonates), poly(3-hydroxybutyric acids),
- 15 polyvinylpyrrolidones, polymers of hydroxyl-substituted lower alkyl (meth)acrylates, polyamides, polyethyleneimines, copolymers thereof, and mixtures thereof.
18. The composition of claim 17 wherein said at least one second component is a polyurethane.
19. The composition of claim 18 wherein said at least one second component is an
- 20 aliphatic polyether polyurethane.
20. The composition of claim 19 wherein said aliphatic polyether polyurethane is capable of absorbing about 5 times to about 20 times its own weight in water.
21. The lubricious composition of claim 16 wherein said at least one second component is polyethylene oxide, polyvinylalcohol, polyvinylpyrrolidone, polyurethane,
- 25 or mixtures thereof.
22. The lubricious composition of claim 1 wherein said at least one second component has a molecular weight of about 50,000 to about 1,500,000 g/mole.
23. The lubricious composition of claim 1 wherein said at least one second component has a weight-average molecular weight of about 75,000 to about 1,000,000
- 30 g/mole.
24. The lubricious composition of claim 1 further comprising at least one member selected from the group consisting of fillers, flow modifiers, antioxidants, coupling agents, adhesion promoters, surfactants, and mixtures thereof.

25. The lubricious composition of claim 24 further comprising at least one flow modifier which is an acrylic flow modifier.
26. The lubricious composition of claim 24 further comprising at least one coupling agent which is a silane.
- 5 27. The composition of claim 1 crosslinked by actinic radiation.
28. A composition curable by actinic radiation lubricious composition comprising:
- a) at least one lubricious polymer; and
  - b) at least one polymerizable alkoxyated acrylate having two or more acrylate groups wherein said at least one polymerizable alkoxyated acrylate has about
- 10 15 wt-% water solubility or greater.
29. The lubricious coating of claim 28 wherein said at least one polymerizable alkoxyated acrylate is non-aromatic.
30. The lubricious coating of claim 28 wherein said at least one polymerizable alkoxyated acrylate has greater than about 50 wt-% water solubility.
- 15 31. The lubricious composition of claim 28 wherein said at least one polymerizable alkoxyated acrylate has about 1 to about 20 moles of alkoxylation.
32. The lubricious composition of claim 31 wherein said alkoxylation is ethoxylation.
33. The lubricious composition of claim 28 wherein said at least one polymerizable
- 20 alkoxyated acrylate is an ethoxylated trimethylol propane triacrylate.
34. The lubricious composition of claim 28 wherein said at least one lubricious polymer is a hydrogel.
35. The lubricious composition of claim 28 wherein said at least one lubricious polymer is selected from the group consisting of polyalkylene glycols, alkoxy
- 25 polyalkylene glycols, polyalkylene oxides, poly((meth)acrylic acids), polyvinylalcohols, poly(meth)acrylamides, polyurethanes, polyvinylsulfonic acids, poly(sodium styrenesulfonates), poly (sodium vinylsulfonates), poly(3-hydroxybutyric acids), polyvinylpyrrolidones, polymers of hydroxyl-substituted lower alkyl (meth)acrylates, polyamides, polyethyleneimines, copolymers thereof, and mixtures thereof.
- 30 36. The lubricious composition of claim 28 wherein said composition is curable by ultraviolet radiation, said composition further comprising at one free radical photoinitiator.

37. The lubricious composition of claim 36 wherein said at least one photoinitiator is a benzophenone, aromatic-aliphatic ketones, acrylated amine synergists,  $\alpha$ -amino ketones, benzil ketals, derivatives thereof, and mixtures thereof.
38. The lubricious composition of claim 37 wherein said at least one photoinitiator is 2-dimethoxy-2-phenyl acetophenone.
39. The lubricious composition of claim 37 wherein said at least one photoinitiator is 2-methyl 1-[4-methylthio) phenyl] 2-morpholinopropan-1-one, 2-benzyl-2-(dimethylamine)-1-[4-morpholinyl)phenyl]-1-butanone or mixture thereof.
40. The lubricious composition of claim 28 further comprising at least one additive selected from the group consisting of flow modifiers, coupling agents, antioxidants, surfactants and mixtures thereof.
41. The lubricious composition of claim 28 wherein said composition is admixed in a solvent or cosolvent blend.
42. The lubricious coating of claim 28 on the surface of a medical device or on the surface of a component thereof.
43. The lubricious coating of claim 42 wherein said medical device or component thereof is a catheter shaft, dilatation balloon, guide wire lumen, guide wire or a stent retaining sleeve.
44. A method of coating at least one surface of a medical device, said method comprises the steps of:
- applying a mixture to said at least one surface of said medical device, said mixture comprising at least one lubricious polymer and at least one polymerizable alkoxyated acrylate having at least two acrylate groups and having a water solubility of about 15 wt-% or greater; and
  - exposing said coating to actinic radiation.
45. The method of claim 44 wherein said at least one polymerizable alkoxyated acrylate has a water solubility about 50 wt-% or greater.
46. The method of claim 44 wherein said actinic radiation is ultraviolet radiation or electron beam radiation.
47. The method of claim 46 wherein said mixture further comprising at least one free radical photoinitiator.

48. The method of claim 47 wherein said at least one photoinitiator is a benzophenone, aromatic-aliphatic ketones, acrylated amine synergists, amino substituted ketones, benzil ketals, derivatives thereof, and mixtures thereof.
49. The method of claim 48 wherein said at least one photoinitiator is 2-dimethoxy-  
5 2-phenyl acetophenone, 2-methyl 1-[4-methylthio) phenyl] 2-morpholinopropan-1-one or mixture thereof.
50. The method of claim 44 wherein said mixture is in a solvent or cosolvent blend.
51. The method of claim 44 wherein said at least one polymerizable alkoxylated acrylate has about 1 to about 20 moles alkoxylate.
- 10 52. The method of claim 44 wherein said at least one polymerizable alkoxylated acrylate has about 2 to about 18 moles alkoxylate.
53. The method of claim 44 wherein said at least one polymerizable alkoxylated acrylate has about 3 to about 15 moles alkoxylate.
54. The method of claim 44 wherein said at least one polymerizable alkoxylated  
15 acrylate is ethoxylated.
55. The method of claim 44 wherein said at least one polymerizable alkoxylated acrylate is non-aromatic.
56. The method of claim 44 wherein said at least one polymerizable alkoxylated acrylate is ethoxylated trimethylol propane triacrylate.
- 20 57. The method of claim 44 wherein said lubricious polymer is selected from the group consisting of polyalkylene glycols, alkoxy polyalkylene glycols, polyalkylene oxides, poly((meth)acrylic acids), polyvinylalcohols, poly(meth)acrylamides, polyurethanes, polyvinylsulfonic acids, poly(sodium styrenesulfonates), poly (sodium vinylsulfonates), poly(3-hydroxybutyric acids), polyvinylpyrrolidones, polymers of  
25 hydroxyl-substituted lower alkyl (meth)acrylates, polyamides, polyethyleneimines, copolymers thereof, and mixtures thereof.
58. The method of claim 44 wherein said lubricious composition further comprises at least one member selected from the group consisting of coupling agents, flow modifiers, antioxidants, surfactants and mixtures thereof.
- 30 59. A photopolymerizable lubricious composition for use on a medical device, the composition comprising:
- a) at least one polymerizable ethylenically unsaturated resin;
  - b) at least one second component which provides lubricity; and
  - c) at least one  $\alpha$ -amino ketone photoinitiator.

60. The photopolymerizable lubricious composition of claim 59 wherein said at least one  $\alpha$ -amino ketone photoinitiator is 2-methyl 1-[4-methylthio) phenyl] 2-morpholinopropan-1-one, 2-benzyl-2-(dimethylamine)-1-[4-morpholinyl)phenyl]-1-butanone or a mixture thereof.
- 5 61. The photopolymerizable lubricious composition of claim 59 wherein said at least one  $\alpha$ -amino ketone photoinitiator is 2-methyl 1-[4-methylthio) phenyl] 2-morpholinopropan-1-one.
62. The photopolymerizable lubricious composition of claim 59 wherein said at least one ethylenically unsaturated resin is an acrylate.
- 10 63. The photopolymerizable lubricious composition of claim 62 wherein said acrylate is an alkoxyated acrylate having at least two acrylate groups per molecule.
64. The photopolymerizable lubricious composition of claim 62 wherein said acrylate is an alkoxyated trimethylol propane triacrylate.
65. The photopolymerizable lubricious composition of claim 62 wherein said  
15 acrylate has greater than about 15 wt-% water solubility.
66. The photopolymerizable lubricious composition of claim 59 wherein said at least one second component is a hydrophilic polymer.
67. The photopolymerizable lubricious composition of claim 66 wherein said at least  
20 one hydrophilic polymer is selected from the group consisting of polyalkylene glycols, alkoxy polyalkylene glycols, polyalkylene oxides, poly((meth)acrylic acids), polyvinylalcohols, poly(meth)acrylamides, polyurethanes, polyvinylsulfonic acids, poly(sodium styrenesulfonates), poly (sodium vinylsulfonates), poly(3-hydroxybutyric acids), polyvinylpyrrolidones, polymers of hydroxyl-substituted lower alkyl (meth)acrylates, polyamides, polyethyleneimines, copolymers thereof, and mixtures  
25 thereof.
68. The lubricious composition of claim 67 wherein said at least one second component is polyethylene oxide, polyvinylalcohol, polyvinylpyrrolidone, polyurethane, or mixtures thereof.
69. The photopolymerizable lubricious composition of claim 68 wherein said at least  
30 one second component is polyethylene oxide.
70. The photopolymerizable lubricious composition of claim 59, said composition further comprising at least one member selected from the group consisting of flow modifiers, antioxidants, coupling agents, surfactants, and mixtures thereof.